

## **ABSTRACT OF THE DISCLOSURE**

The present invention relates to a method and device for etching a silicon substrate that can keep surface unevenness of a structured surface formed by etching to within a fixed value. After an etching mask is formed on its surface, a silicon substrate S is mounted on a base 3 in an etching device 1. An etching gas (SF<sub>6</sub>) and a protective film forming gas (C<sub>4</sub>F<sub>8</sub>) are supplied to a chamber 2. The SF<sub>6</sub> gas and the C<sub>4</sub>F<sub>8</sub> gas supplied to the chamber 2 are converted to plasma using a coil 16 to which high-frequency electrical power is applied. For example, by supplying a large amount of SF<sub>6</sub> gas while high-frequency electrical power is applied to the base 3, dry etching primarily at the etching grounds is advanced. Conversely, by supplying a large amount of C<sub>4</sub>F<sub>8</sub> gas, protective film formation primarily to the etching structured surfaces is advanced. By repeating these steps, deep grooves with smooth structured surfaces can be formed.